

CLAIMS

1. An electron source characterized in that a barium-supplying source consisting of a complex oxide comprising barium oxide and an oxide of metal other than barium, is
5 provided at a portion of a single crystal needle of tungsten or molybdenum.
2. The electron source according to Claim 1, wherein the metal other than barium is at least one metal element selected from the group consisting of Groups IIIA, IVB
10 and IIIB of the Periodic Table.
3. The electron source according to Claim 1 or 2, wherein the complex oxide is at least one complex oxide selected from the group consisting of BaAl_2O_4 , $\text{BaAl}_{12}\text{O}_{19}$, $\text{Ba}_3\text{Sc}_4\text{O}_9$, BaSc_2O_4 , BaTiO_3 , BaZrO_3 and BaHfO_3 .
- 15 4. The electron source according to any one of Claims 1 to 3, wherein a part of barium of the barium oxide is substituted by a Group IIA element other than barium.
5. The electron source according to any one of Claims 1 to 4, wherein the single crystal needle of tungsten or
20 molybdenum has a $\langle 100 \rangle$ orientation and has a flat surface consisting of a (100) crystallographic plane at the apex of the needle.
6. The electron source according to any one of Claims 1 to 4, wherein the single crystal needle of tungsten or
25 molybdenum has a $\langle 211 \rangle$ orientation and has a flat surface consisting of a (211) crystallographic plane at the apex of the needle.

7. The electron source according to any one of Claims 1 to 6, wherein when it is operated at an angular intensity of 4.0 mA/sr, the total emission current is at most 350 μ A.

5 8. The electron source according to any one of Claims 1 to 7, which is an electron source to be used for a scanning electron microscope, a transmission electron microscope, a surface analyzer, a semiconductor wafer inspection apparatus or an electron beam lithography
10 machine.

9. A method for using an electron source, characterized in that an electron source provided with a barium-supplying source consisting of a complex oxide comprising barium oxide and an oxide of metal other than barium at a
15 portion of a single crystal needle of tungsten or molybdenum, is used at a needle temperature of from 1000 K to 1300 K.

10. A method for producing an electron source, characterized in that an electron source provided with a
20 barium-supplying source consisting of a complex oxide comprising barium oxide and an oxide of metal other than barium at a portion of a single crystal needle of tungsten or molybdenum, is heated at from 1000 K to 1700 K under application of a positive electric potential.